



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 10/052,145 | 01/17/2002 | Tomohiro Konuma | MAT-8220US | 1041 |

7590 01/07/2005
RATNER AND PRESTIA
Suite 301
One Westlakes, Berwyn
P.O. Box 980
Valley Forge, PA 19482-0980

EXAMINER

HARPER, V PAUL

| ART UNIT | PAPER NUMBER |
|----------|--------------|
|----------|--------------|

2654

DATE MAILED: 01/07/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/052,145

Applicant(s)

KONUMA ET AL.

Examiner

V. Paul Harper

Art Unit

2654

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-8 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. ____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date <u>1/17/02, 1/16/04</u> . | 6) <input type="checkbox"/> Other: ____ |

DETAILED ACTION

Information Disclosure Statement

1. The Examiner has considered the references listed in the Information Disclosure Statements dated 01/17/02 and 01/16/04. Copies of the Information Disclosure Statements are attached to this office action.

Specification

2. The abstract of the disclosure is objected to because on page 2, line 18, the sentence beginning "At this time" is ungrammatical. Correction is required. See MPEP § 608.01(b).

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-8 are rejected under 35 U.S.C. 102(b) as being anticipated by Schwartz et al. (U.S. Patent 5,241,619), hereinafter referred to as Schwartz.

Regarding **claim 1**, Schwartz discloses a speech recognition system that uses a word dependent N-best search method. Schwartz's method includes the following steps:

Art Unit: 2654

- a feature-amount extracting step for extracting a feature amount based on a frame of an input utterance (Fig. 1, items 8 and 9; col. 3, lines 40-43, where the features correspond to the characterizing vectors);
- a storing step for determining whether a current processing frame is within or at an end of a candidate word previously registered, and storing the candidate word on the basis of a first hypothesis-storage determining criterion when within a word (col. 3, lines 43-51, in the selected words scores are accumulated for each of the n most likely word theories with an inherent recording of the candidate word; different state theories within a word are maintained) and on the basis of a second hypothesis-storage determining criterion when at a word end (col. 3, lines 51-54, at the end of each word, probabilities and identities are recorded);
- a developing step for developing a hypothesis by extending utterance segments expressing the word when a stored candidate word is within a word and by joining a word to follow according to an inter-word connection rule when at a word end (col. 3, lines 50-59, each new word is begun with consideration given to the previous words and a grammar model; at the end of the utterance the word sequences are reassembled);
- an operating step of computing a similarity of between the feature amount extracted from the input utterance and a frame-based feature amount of an acoustic model of the developed hypothesis, and calculating a new recognition score from the similarity and a recognition score of the hypothesis of up to an immediately preceding frame calculated from the similarity (col. 3, lines 50-59; col. 5, lines 30-45, at each state within a word the probability is calculated; also col. 6, lines 26-33); and

- a step of repeating the storing step, the developing step and the operating step until the processing frame becomes a last frame of the input utterance and outputting, as a recognition result approximate to the input utterance, at least one of hypotheses in the order of higher recognition score due to processing the last frame (col.5, lines 40-45; when the utterance is completed, the word sequences with the highest probabilities are assembled with inherent storage).

Regarding **claim 2**, Schwartz teaches everything claimed, as applied above (see claim 1). In addition, Schwartz teaches that the “the first hypothesis-storage determining criterion is to select candidate words of within a predetermined threshold from a maximum value of the recognition score (col. 6, lines 11-15, Fig. 4A, lines 36 and 38 and 46, only models [word candidates/theories] that exceed the threshold are maintained) while the second hypothesis-storage determining criterion is to select a predetermined number of candidate words as counted from a candidate word maximum in the recognition score” (col. 6, lines 26-31, Fig. 4A, line 46 where n is the maximum number of word theories to keep for any state—including the final state).

Regarding **claim 3**, Schwartz discloses a speech recognition system that uses a word dependent N-best search method. Schwartz’s system includes the following:

- a feature-amount extracting section for extracting a feature amount based on a frame of an input utterance (Fig. 1, items 8 and 9; col. 3, lines 40-43, where the features correspond to the characterizing vectors);

Art Unit: 2654

- a search control section for controlling to develop a hypothesis by extending based on utterance segments to express a word when the hypothesis is within a word and by joining a word to follow according to an inter-word connection rule previously determined when at a word end (Fig. 1, items 12, 14, and 16; col. 3, lines 50-59, each new word is begun with consideration given to the previous words and a grammar model; different state theories within a word are maintained; at the end of the utterance the word sequences are reassembled);
- a similarity computing section for computing a similarity of between a frame feature amount extracted from the input utterance and a frame feature amount of an acoustic model of the developed hypothesis (col. 3, lines 40-59; col. 5, lines 30-45, at each state within a word the probability is calculated for selected Markov states; also col. 6, lines 26-33);
- a search operating section for operating a recognition score from the similarity and recognition score of the hypothesis of up to an immediately preceding frame (col. 3, lines 40-59; col. 5, lines 30-45, at each state within a word the probability is calculated; at the end of the utterance the word sequences having the highest scores are accumulated; also col. 6, lines 26-33);
- a hypothesis determining section for determining whether a current processing frame is within a word or at a word end of the hypothesis and using the recognition score to select a candidate word according to a first determining criterion when within a word (col. 3, lines 43-51, scores are accumulated for each of the n most likely word theories with an inherent recording of the candidate word) and to select a candidate

word according to a second determining criterion when at a word end (col. 3, lines 51-54, at the end of each word, probabilities and identities are recorded);

- a hypothesis storing device for storing a hypothesis determined to be stored (col. 3, lines 50-59; word sequences are reassembled with inherent storage);
- a word hypothesis registering device for registering as a new hypothesis the hypothesis and the recognition score (col. 3, lines 50-59; word theories are created and since previous theories can be accessed they must have been previously stored); and
- a recognition result output section for continuing the frame-based process to a last of the input utterance and outputting at least one hypothesis in the order of higher recognition score (col. 3, lines 50-59; at the end of the utterance word sequences with the highest accumulated scores are reassembled; Fig. 1, **MOST LIKELY SENTENCE AND INTERPRETATION**).

Regarding **claim 4**, Schwartz teaches everything claimed, as applied above (see claim 3). In addition, Schwartz teaches "the first determining criterion is to select candidate words of within a predetermined threshold from a maximum value of the recognition score (col. 6, lines 11-15, Fig. 4A, lines 36 and 38 and 46, only models [word candidates/theories] that exceed the threshold are maintained) while the second is to select a predetermined number of determining criterion candidate words as counted from a candidate word maximum in the recognition score" (col. 6, lines 26-31, Fig. 4A, line 46 where n is the maximum number of word theories to keep for any state—including the final state).

Regarding **claim 5**, this claim is a program version of the method claim 1. Furthermore, claim 5 has limitations similar to claim 1 and is rejected for the same reasons.

Regarding **claim 6**, this claim has limitations similar to claim 2 and is rejected for the same reasons.

Regarding **claim 7**, this claim is a computer-readable recording medium for recording a program that executes a method with limitations similar to those in claim 1 and is rejected for the same reasons.

Regarding **claim 8**, this claim has limitations similar to those found in claim 2 and is rejected for the same reasons.

Citation of Pertinent Art

4. The following prior art made of record but not relied upon is considered pertinent to the applicant's disclosure:

- Chow (U.S. Patent 5,706,397) discloses a speech recognition system with multi-level pruning for acoustic matching using scoring and thresholds.

Art Unit: 2654

- Kao (U.S. Patent 6,374,220) discloses an N-best search for continuous speech recognition using Viterbi pruning for non-output differentiation states.
- Alleva, F ("Search Organization in the Whisper Continuous Speech Recognition System," IEEE Workshop on Automatic Speech Recognition and Understanding, 1997) teaches an approach to decoding that includes heuristic pruning.
- The HTK Book (for HTK Version 2.2, Jan 1999) teaches the use of the Hidden Markov Model approach for language understanding with multiple techniques for pruning at various levels during the recognition process.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to V. Paul Harper whose telephone number is 703 305-4197. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richemond Dorvil can be reached on 703 305-9645. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 2654

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

V. Paul Harper
Examiner
Art Unit 2654

1/03/2005

A handwritten signature in black ink that reads "V. Paul Harper". The signature is written in a cursive style with a large, stylized "V" and "H".